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[no drawing available]

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Inventor(s):Bowers, Graham**Application No.** GB8228461 GB, **Filed** 19821005, **A1 Published** 19840426**Abstract:** NotAvailable**Int'l Class:** E04B00158;**Patents Cited:**

→ GB0445476 A

Patents Citing This One (2):→ US5590504A1 19970107 Signfix Limited
Mounting devices→ GB2281085A 19950222 Alusuisse-Lonza Services Ltd(CH)
Structure for use in building modules[Go to Claims](#)**Detailed Description**

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SPECIFICATION

Jointing device 5This invention relates to a jointing device, a joint assembly incorporating said device and a method of forming the latterwhich is particularly applicable to the construction of prefabricated environmentally controlled rooms or buildings.

Rooms or buildings wherein the environment can be precisely controlled with regard to parameters such.as temperature, humidity or air purity are nowadays required in many spheres of human 75 activity. For example, such rooms or buildings may be required as operating theatres or sites of drug orfood

manufacture wherein one or all of the abovementioned parameters may need to be controlled. In most cases the purity of the air in such rooms or buildings is of paramount importance with regard to bacterial and other types of contamination. As it is virtually impossible to adequately seal or control all points of air and entry in existing rooms or buildings and thereby maintain a sterile zone therein, it is usual to construct a new **prefabricated room** (^) or building in instances where precise environmental control is required.

Hitherto, in the construction of a **prefabricated room** (^) or building for one of the aforementioned purposes, the first step has been the erection of a structural frame of vertical columns, horizontal cross beams and roof members in accordance with the desired final configuration of the room or building. Such a frame includes a large number of interconnections of the various parts by way of known angled brackets and bolts. Thereafter metal panels for forming the walls and roof of the building are bolted to the frame members and to each other in known manner.

Naturally, each such building must be constructed so as to meet pre-set standards of strength and also of 100% accuracy of the joints. Indeed, the joints should ideally be airtight so that subsequent environmental control of the interior may be satisfactorily achieved. If heavy apparatus is intended to be suspended from the ceiling or roof of the completed building, as, for example, may often be the case in operating theatres where overhead lights and ventilation ducts are usual, additional structural members should be provided in the roof frame to permit a weight of about 3/4 tonne to be safely borne.

The above-described method of construction is, as may be expected, extremely costly in terms of materials and also time-consuming and troublesome for the operatives because of the large number of different types of interconnections which have to be made. Moreover, problems frequently arise when fitting the sheet steel panels to the structural steel frame as the manufacturing tolerances normally specified within the two different types of engineering production are incompatible. In the worst possible situation this might result in inaccurate joints which reduce the strength of the structure and the accuracy of eventual environmental control of the building interior. If the structural steel components were GB 2128 215 A 1 manufactured to a higher degree of accuracy, their cost would be prohibitive.

An object of the present invention is to eliminate the structural steel frame, reduce the cost and significantly increase the strength of the aforementioned type of prefabricated structure by providing a simple jointing device with which an accurate close-fitting joint may quickly and easily be formed.

With this object in view, the present invention provides a jointing device comprising a first profile strip formed generally as a channel section with first and second opposing webs connected by a base and having a lateral extension at the free end of the first web, and a second profile strip of similar configuration, the lateral extension of the first profile strip firmly abutting the base of the second profile strip so as to provide a gap between the base of the first profile strip and the lateral extension of the second profile strip sufficient to receive and secure abutting flanges of adjoining structural members.

Advantageously, the lateral extension of each profile strip is perpendicular to the first web of the channel section and the resultant gap between the base of the first strip and the lateral extension of the second strip is parallel-sided.

The first web of the first profile strip necessarily faces the first web of the second profile strip and conveniently, a slight gap remains therebetween, for example, to permit fine adjustment during assembly of the device or introduction of a building sealant.

Preferably at least one of the profile strips is formed with a flange at the end of the lateral extension.

Each profile strip may conveniently be formed with a shallow inwardly projecting rim along each edge.

In some circumstances, at least one rim of at least one strip may have an outwardly projecting lip for interfitment with another structural member.

A further aspect of the present invention is a joint assembly comprising a first profile strip formed generally as a channel section with first and second opposing webs connected by a base and having a lateral extension from the end of the first web, a second profile strip of similar configuration, the lateral extension of the first profile strip firmly abutting the base of the second profile strip so as to provide a gap between the base of the first profile strip and the lateral extension of the second profile strip, and two structural members having abutting flanges which project into and are secured together in said gap.

Preferably, the heights of the flanges of the structural members are less than the length of the gap between the profile strips.

The second web of the first profile strip advantageously abuts and/or is secured to a region of one of the structural members adjacent its flange.

The lateral extension of the second profile strip is advantageously provided with a flange which may abut and/or be secured to a region of the other structural member adjacent its flange.

The flange of the second profile strip is advantageously disposed in the same plane as the second web of the first profile strip whenever the two. The drawing(s) originally filed was/were informal and the print here reproduced is taken from a later filed formal copy.

2 structural members are disposed in the same plane as each other.

Another aspect of the invention is a method of forming the aforesaid joint assembly comprising the steps of forming a respective flange at edges of two structural members to be joined together; providing from mild steel panels 10 connected together by jointing devices according to the present invention. As indicated by the sectional lines 2-2, 3-3, 4-4, 5-5, a number of different jointing devices are required to provide for situations where the panels 10 adjoin one another at different angles or where additional structural members need to be mounted. For example, adjoining roof top panels 13 are co-planar and adjoining wall panels 11 are usually co-planar, whereas wall panels 11 adjoin roof side panels 12 at a pre-set obtuse angle, and roof side panels 12 adjoin roof top panels 13 at a different pre-set angle. Wall corner panels 14 and roof side corner panels 15 are also necessary in the structure and may meet adjacent panels at yet different angles.

A first practical embodiment of the jointing device of the invention is illustrated in Fig. 2 as part of a joint assembly wherein two wall panels 11 are secured together. This jointing device comprises first and second profile strips 20, 30 of similar configuration and fitted together so as to provide a gap 16 for reception and securement of abutting flanges 17, 18 of adjacent structural members in the form of the wall panels 11.

As shown, the first profile strip 20 is formed generally as a channel section with first and second opposing parallel webs 21 and 22 of substantially equal length connected by a base 23 and having a lateral extension 24 at the free end of the first web 21. The lateral extension 24 has a flange 25 which is arranged parallel to the webs 21 and 22. The lateral extension 24 itself is parallel and of similar length to the base 23 and perpendicular to the webs 21, 22 and the flange 25. The edges of the profile strip 20, i.e. the free edges of the second web 22 and the flange 25 are each provided with a shallow inwardly

projecting rim 26,27 respectively. The second profile strip 30 is of similar configuration being formed generally as a channel section with opposing parallel first and second webs 31,32 connected by a base 33, a lateral extension 34 with a flange 35 projecting from the first web 31 such that the lateral extension 34 is parallel with the base 33 and the flange 35 is perpendicular thereto. Again, the second web 32 and the flange 35 have respective shallow rims 36,37. However, the second profile strip 30 differs from the first strip 20 in that its second web 32 is shorter than its first web 31. Moreover, the flange 35 of the second profile strip 30 is longer than the corresponding flange 25 of the first profile strip 20. The first and second profile strips 20, 30 are formed of mild steel and are cut or formed to a length equal to the height of the wall panels 11. These strips 20,30 are fitted together "back to back" such that the lateral extension 24 of the first profile strip 20 firmly abuts the base 33 of the second strip 30 so as to provide a gap 16 sufficient to receive and secure abutting flanges 17,18 of adjoining wall panels 11. A gap 50 of approximately 1.0 mm is provided between the first web 21 of the first profile strip 20 and the first web 31 of the second profile strip 30. This is to enable finite adjustment, if required, in the direction of the arrows 51, to achieve a perfectly flat surface across the faces of the adjoining structural panels. Alternatively or additionally, a building sealant may be introduced into the gap 50. First and second profile strips each formed generally as a channel section with first and second opposing webs connected by a base and having a lateral extension at the free end of the first web; securing the base of the first profile strip to the inner side of the flange of the one structural member; securing the lateral extension of the second profile strip to the inner side of the flange of the other structural member; interfitting the two profile strips such that the lateral extension of the first strip firmly abuts the base of the second profile strip and the flanges of the two structural members also firmly abut each other; and securing the resultant assembly, for example by means of bolts.

Since it is possible to produce profile strips of the above-described configurations with very accurate dimensions and the flanges on the structural members may also be accurately formed, the resultant assembly is close-fitting and substantially airtight. Moreover, by virtue of the specifically chosen configurations of the profile strips, it has been proven by stress calculations that these joints are particularly strong and rigid.

The profile strips may be produced relatively inexpensively and the interconnection of the strips and the structural members to form the joints is a quick and easy operation compared to previous methods of assembly of prefabricated parts. Accordingly a structure formed by using the proposed jointing device and method of joint assembly would be considerably less expensive to erect than a similar structure using known jointing devices and assembly methods.

The invention will be described further, by way of example, with reference to the accompanying drawings, in which:

Fig. 1 is a diagrammatic perspective view of an entire prefabricated building incorporating various embodiments of the jointing device and joint assembly of the present invention; Fig. 2 is a fragmentary perspective view, generally viewed along the line in the direction of the arrows along the line 2-2 of Fig. 1, of a first practical embodiment of the joint assembly of the invention incorporating a first embodiment of the jointing device of the invention; Fig. 3 is a fragmentary perspective view, generally viewed in the direction of the arrows along either of the lines 3-3 of Fig. 1, illustrating a second practical embodiment of the joint assembly of the invention, incorporating a second embodiment of the jointing device of the invention, and additional structural members which may be attached to the assembly; Fig. 4 is a partial cross-section along the line 4-4 of Fig. 1 of a third practical embodiment of the joint assembly of the invention incorporating a third embodiment of the jointing device of the invention; and Fig. 5 is a partial cross-section along either of the lines 5-5 of Fig. 1 illustrating a fourth partial embodiment of the joint assembly of the invention, incorporating a fourth embodiment of the jointing device, attached to a further structural member.

Fig. 1 illustrates a prefabricated building, for example an operating theatre, which is constructed entirely from mild steel panels 10 connected together by jointing devices according to the present invention. As indicated by the sectional lines 2-2, 3-3, 4-4, 5-5, a number of different jointing devices are required to provide for situations where the panels 10 adjoin one another at different angles or where additional structural members need to be mounted. For example, adjoining roof top panels 13 are co-planar and adjoining wall panels 11 are usually co-planar, whereas wall panels 11 adjoin roof side panels 12 at a pre-set obtuse angle, and roof side panels 12 adjoin roof top panels 13 at a different pre-set angle. Wall corner panels 14 and roof side corner panels 15 are also necessary in the structure and may meet adjacent panels at yet different angles.

A first practical embodiment of the jointing device of the invention is illustrated in Fig. 2 as part of a joint assembly wherein two wall panels 11 are secured together. This jointing device comprises first and second profile strips 20, 30 of similar configuration and fitted together so as to provide a gap 16 for reception and securement of abutting flanges 17, 18 of adjacent structural members in the form of the wall panels 11.

As shown, the first profile strip 20 is formed generally as a channel section with first and second opposing parallel webs 21 and 22 of substantially equal length connected by a base 23 and having a lateral extension 24 at the free end of the first web 21. The lateral extension 24 has a flange 25 which is arranged parallel to the webs 21 and 22. The lateral extension 24 itself is parallel and of similar length to the base 23 and perpendicular to the webs 21, 22 and the flange 25. The edges of the profile strip 20, i.e. the free edges of the second web 22 and the flange 25 are each provided with a shallow inwardly projecting rim 26, 27 respectively. The second profile strip 30 is of similar configuration being formed generally as a channel section with opposing parallel first and second webs 31, 32 connected by a base 33, a lateral extension 34 with a flange 35 projecting from the first web 31 such that the lateral extension 34 is parallel with the base 33 and the flange 35 is perpendicular thereto. Again, the second web 32 and the flange 35 have respective shallow rims 36, 37. However, the second profile strip 30 differs from the first strip 20 in that its second web 32 is shorter than its first web 31. Moreover, the flange 35 of the second profile strip 30 is longer than the corresponding flange 25 of the first profile strip 20. The first and second profile strips 20, 30 are formed of mild steel and are cut or formed to a length equal to the height of the wall panels 11. These strips 20, 30 are fitted together "back to back" such that the lateral extension 24 of the first profile strip 20 firmly abuts the base 33 of the second strip 30 so as to provide a gap 16 sufficient to receive and secure abutting flanges 17, 18 of adjoining wall panels 11. A gap 50 of approximately 1.0 mm is provided between the first web 21 of the first profile strip 20 and the first web 31 of the second profile strip 30. This is to enable finite adjustment, if required, in the direction of the arrows 51, to achieve a perfectly flat surface across the faces of the adjoining structural panels 11.

Alternatively or additionally, a building sealant may be introduced into the gap 50.

In the aforesaid position, the respective second webs 22, 32 of the first and second strips 20, 30 are co-planar with the respective flanges 35, 25 of the second and first strips 30, 20.

The mild steel wall panels 11 should be provided with appropriate flanges of substantially equal height along each edge which is intended to adjoin another panel 10. In this case, perpendicular flanges 17, 18 are provided. In order to secure the two wall panels 11 together and form a joint assembly as illustrated in Fig. 2 it is envisaged that the base 23 and the second web 22 of the first profile strip are spotwelded, as at 19, to the inner side of the flange 17 and the region of the one panel 11 adjacent thereto. Similarly, the lateral extension 34 and the flange 35 of the second profile strip 30 are spotwelded to the inner side of the flange 18 and the region of the other panel 11 adjacent thereto. It will be appreciated that as long as the profile strips 20, 30 and the panels 11 were accurately machined during production, so as to have smooth

level surfaces and right angle bends, the aforesaid connections will be extremely close-fitting. The two profile strips 20,30 are subsequently interengaged as previously described, and as illustrated in Fig. 2, to form a jointing device with the panel flanges 17,18 abutting each other, as shown, within the gap 16 between the base 23 of the first strip 20 and the lateral extension 34 of the second strip 30. The entire assembly is firmly secured in this configuration by bolts 29 to form a particularly strong and close-fitting joint.

Fig. 3 illustrates a second embodiment of the jointing device of the invention as may be used to secure two roof top panels 13 together. The device and the method of forming the point assembly are virtually identical to what has just been described and the same reference numerals are used for corresponding parts. In this embodiment however, the rim 27 of the first profile strip 20 and the rim 36 of the second profile strip 30 are provided with respective perpendicular outwardly projecting lips 28,38, which lie in the same place as each other in the assembled joint. Additional structural members such as outer roof panels 39, as illustrated, may be seated or supported upon said lips 28,38.

A third embodiment of the jointing device of the invention is illustrated in Fig. 4. As indicated in Fig. 1, this may be used for formation of a joint between a wall panel 11 and a roof side panel 12. The same reference numerals have again been used for parts corresponding to parts illustrated in Fig. 2. This embodiment of the jointing device of the invention differs from the embodiment illustrated in Fig. 2 in that the second web 22 of the first profile 20 is considerably longer than the first web 21 thereof and the edge rim 26 extends at an acute angle to said second web 22. More importantly, however, this embodiment includes a third angled profile strip 40 one limb 41 of which is equal in length to and abuts the aforesaid second web 22. The strip 40 also has inwardly projecting edge rims 43.

The method of forming a joint assembly incorporating this device is generally similar to that described in relation to the embodiment of Fig. 2. The third profile strip 40 is required to interfit between the second web 22 and the region of the sloping roof side panel 12 adjacent its flange 17 so as to provide a rigid joint. During assembly, the limb 41 of the third strip 40 should firstly be welded to the first strip 20 and the resultant unit subsequently welded to the roof side panel 12 such that the base 23 of the first strip 20 adjoins the flange 17 which is arranged at an obtuse angle to the main body of the panel 12, and the second limb 42 of the strip 40 adjoins a region of the panel 12 adjacent said flange 17. The first and second strips 20, 30 are then interengaged and bolted together as previously described so as to secure the panel flanges 17,18 together in substantially air-tight manner.

Finally, a fourth embodiment of the jointing device of the invention is illustrated in Fig. 5. This embodiment may be used to provide a joint between a roof side panel 12 and a roof top panel 13 or a roof side corner panel 15. Compared to the device of Fig. 2, the second web 22 of the first profile strip 20 extends outwardly from the base 23 at an obtuse angle so as to be able to abut the sloping panel 12 and the second web 32 of the second profile strip 30 is substantially equal in length to the first web 31 thereof. Moreover, a third profile strip 45 having a lazy-Z-shaped crosssection is welded to the second web 32 of the second profile strip 30 in order to provide a lip 46 extending outwardly from and substantially perpendicular to the rim 36 in the same manner as the integral lips 28,38 shown in Fig. 3. A further structural member 49, such as an outer roof panel may be secured to the lip 46, e.g. by means of bolts, as indicated in Fig. 5.

The invention is not limited to the precise details of the foregoing embodiments and many variations are possible depending on the angles at which adjacent panels are intended to meet. It will, of course, be understood that the locations referred to for particular embodiments of the jointing device are merely those in the example illustrated in Fig. 1. Also the profile strips and the structural panels may be formed of a different material to mild steel, e.g. aluminium or another suitable metal or alloy.

Calculations have indicated that jointing devices having the configurations now proposed are capable of withstanding considerable stress such that a structure formed entirely of flanged panels connected by such jointing devices does not require any internal supporting framework and can accommodate various types of roof loading of at least four times that of present systems without requiring additional strengthening.

As previously mentioned, such joints are particularly advantageous for structures intended to be environmentally controlled, e.g. dust-free, sterile, or of constant temperature or humidity, because the precision which may be readily attained in the production of flanged panels and profile strips permits these members to fit together with great accuracy and form substantially airtight joints.

Claims (English)

CLAIMS

GB 2 128 215 A 4 1. A jointing device comprising a first profile strip formed generally as a channel section with first and second opposing webs connected by a base and having a lateral extension at the free end of the first web, and a second profile strip of similar configuration, the lateral extension of the first profile strip firmly abutting the base of the second profile strip so as to provide a gap between the base of the first profile strip and the lateral extension of the second profile strip sufficient to receive and secure abutting flanges of adjoining structural members.

2. A device as claimed in claim 1 wherein the lateral extension of each profile strip is perpendicular to the first web of the channel section and the resultant gap between the base of the first strip and the lateral extension of the second strip is parallel-sided.

3. A device as claimed in claim 1 or 2 wherein a slight gap remains between the first web of the first profile strip and the first web of the second profile strip (which necessarily face one another) to permit fine adjustment during assembly of the device or introduction of a building sealant.

4. A device as claimed in claim 1, 2 or 3 wherein at least one of the profile strips is formed with a flange at the end of the lateral extension.

5. A device as claimed in any preceding claim wherein each profile strip is formed with a shallow inwardly projecting rim along each edge.

6. A device as claimed in any preceding claim wherein at least one rim of at least one strip has an outwardly projecting lip for interfitment with another structural member.

7. A joint assembly comprising a first profile strip formed generally as a channel section with first and second opposing webs connected by a base and having a lateral extension from the end of the first web, a second profile strip of similar configuration, the lateral extension of the first profile strip firmly abutting the base of the second profile strip so as to provide a gap between the base of the first profile strip and the lateral extension of the second profile strip, and two structural members having abutting flanges which project into and are secured together in said gap.

8. A joint assembly as claimed in claim 7 wherein the heights of the flanges of the structural members are less than the length of the gap between the profile strips.

9. A joint assembly as claimed in claim 8 wherein the second web of the first profile strip abuts and/or is

secured to a region of one of the structural members adjacent its flange.

10. A joint assembly as claimed in claim 8 or 9 wherein the lateral extension of the second profile strip is provided with a flange which abuts and/or is secured to a region of the other structural member adjacent its flange.

11. A joint assembly as claimed in claim 9 and 10 wherein the flange of the second profile strip is disposed in the same plane as the second web of the first profile strip and the two structural members are disposed in the same plane as each other.

12. A method of forming the joint assembly claimed in any of claims 7 to 11 comprising the steps of forming a respective flange at edges of two I structural members to be joined together; providing first and second profile strips each formed generally as a channel section with first and second opposing webs connected by a base and having a lateral extension at the free end of the first web; securing the base of the first profile strip to the inner side of the flange of the one structural member; securing the lateral extension of the second profile strip to the inner side of the flange of the other structural member; interfitting the two profile strips such that the lateral extension of the first strip firmly abuts the base of the second profile strip and the flanges of the two structural members also firmly abut each other; and securing the resultant assembly.

13. A jointing device substantially as hereinbefore described with reference to and as illustrated in Fig. 2, or Fig. 3, or Fig. 4, or Fig. 5 of the accompanying drawings.

14. A joint assembly substantially as hereinbefore described with reference to and as illustrated in Fig. 2, or Fig. 3, or Fig. 4, or Fig. 5 of the accompanying drawings.

15. A method of forming a joint assembly substantially as hereinbefore described.

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